

# INTERPROFESSIONAL REVIEW OF A POSTPARTUM HEMORRHAGE PROTOCOL

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Interprofessional Review of a Postpartum Hemorrhage Protocol

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## Abstract

**Problem:** Postpartum hemorrhage, heavy bleeding that occurs after birth, is the leading cause of maternal morbidity and mortality worldwide, affecting up to 5% of all births. Rates of postpartum hemorrhage continue to rise in the United States, despite acknowledgement of this complication and its' impact on maternal health. Emphasis has been placed on early identification of risk factors for hemorrhage and creation of protocols to improve interprofessional efficiency when managing a postpartum hemorrhage. Management of this complication requires interprofessional collaboration amongst healthcare professionals, including nursing staff, Certified Nurse-Midwives, obstetrician/gynecologists, anesthesia providers, and others.

**Project Aim:** This Doctor of Nursing Practice quality improvement project aimed to: (1) develop an evidence-based protocol for PPH, which will: (a) increase early identification of postpartum hemorrhage after birth; and (b) improve interprofessional collaboration during an active PPH emergency.

**Project Method:** This evidence-based protocol was developed based on the Iowa Model of Evidence-Based Practice to Promote Quality of Care and will identify women at greater risk for hemorrhage and outline an interprofessional postpartum hemorrhage protocol. A team of healthcare professionals, representing different healthcare professions that care for patients during postpartum hemorrhage, evaluated the protocol utilizing the AGREE II evaluation tool.

**Project Results:** Surveys were distributed using RedCap with a sample of 26 participants: 22 (84.6%) registered nurses, three (11.5%) Certified Nurse Midwives and one (3.8%) obstetrician.

Responses communicated a desire for a PPH protocol within this local community hospital.

Survey responses and comments were used to revise the PPH protocol.

*Keywords:* postpartum hemorrhage, hemorrhage, obstetric, maternal mortality, maternal morbidity, PPH, protocol, quality improvement

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## Interprofessional Review of a Postpartum Hemorrhage Protocol

Postpartum hemorrhage (PPH) is the cause of death for approximately 140,000 women every year, and 45% of maternal morbidity is associated with PPH (ModernMedicine Network, 2017). Maternal morbidity is defined as negative effects due to pregnancy or childbirth. For this project, maternal morbidity refers to negative physical impacts due to childbirth. Maternal mortality is maternal death due to pregnancy and childbirth. The United States ranks 47<sup>th</sup> in the world for maternal mortality. The rate of PPH has increased and continues to rise. It occurs at a rate between 1-5% of all births (ModernMedicine Network, 2017), which translates to, 125,000 women a year who are affected by PPH, and a 183% increase in the number of women receiving blood products at birth (Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2017).

The average blood loss for a vaginal delivery is 500 mL and 1000 mL for a cesarean delivery (*Best Practices*, 2017). Postpartum hemorrhage was previously defined as a vaginal delivery with 500 mL or greater blood loss and Cesarean delivery with 1000 mL or greater blood loss. PPH was redefined in 2017 by the American College of Obstetricians and Gynecologists (ACOG), as a total blood loss of 1000 mL or greater, no matter the route of delivery, or significant blood loss post-delivery with symptomatic hypovolemia. Hemorrhage after birth is classified as either primary or secondary.

Primary PPH is defined as a cumulative blood loss of 1000 mL or more within the first 24 hours of delivery regardless of route of delivery. It is also defined as significant blood loss with symptoms of hypovolemia, including tachycardia and hypotension, that occurs within the first 24 hours of delivery. All women with a total blood loss of 500 to 1000 mL postpartum should be monitored closely and may require PPH intervention to prevent further morbidity or

mortality (*Best Practices*, 2017). A blood loss greater than 500 mL for a vaginal delivery, while not diagnostic of a PPH, is not considered normal and deserves additional surveillance.

Secondary PPH is defined as excessive vaginal or uterine bleeding that occurs between 24 hours post-delivery up to 12 weeks postpartum. The risk of secondary PPH peaks during the first two weeks postpartum.

#### Statement of Problem

The rate of PPH within the United States continues to grow. As PPH rates increase, there is a greater importance regarding early identification of risk factors for hemorrhage and improving interprofessional efficiency during management of the hemorrhage (California Maternal Quality Care Collaboration [CMQCC], 2015). A PPH protocol aims to identify PPH earlier through accurate blood loss calculation and identification of women at high risk for PPH. The protocol also improves timely implementation of hemorrhage interventions, including: (a) medication administration; (b) second IV starts; (c) administration of blood products; (d) uterine tamponade techniques; and (e) surgical intervention, when appropriate. The protocol not only identifies tasks to be completed, but also identifies which team members should be notified and what each individual should be doing to manage the PPH. Early identification is key to appropriately managing PPH as most women do not become symptomatic of PPH until a significant amount of blood has been lost (ACOG, 2017). PPH symptoms typically occur when 25%, or approximately 1500 mL of blood, has been lost (ACOG, 2017). This amount of blood loss leads to vital sign changes including hypotension and tachycardia. When a patient is symptomatic of blood loss there is less time to manage the PPH with minimal interventions alone, such as medication or blood administration.



The first step in early identification of PPH is to identify women at greater risk for PPH on admission, before delivery has happened (ACOG, 2017). PPH admission tools are shown to identify 60-85% of patients who will have a PPH (ACOG, 2017). PPH can occur in low-risk women, but is more likely to occur in women with higher risks of PPH (ACOG, 2017). PPH categories include low-risk, medium-risk and high-risk women (ACOG, 2017). Women at low risk for PPH have the following characteristics: (a) singleton gestation; (b) less than 4 previous deliveries; (c) unscarred uterus; and (d) no history of a PPH with previous deliveries. Medium-risk women are categorized as those having at least one of the following characteristics: (a) prior cesarean section or uterine surgery; (b) more than 4 previous deliveries; (c) multiple gestation; (d) large uterine fibroids; (e) chorioamnionitis; (f) magnesium sulfate use; and (g) prolonged use of oxytocin. Women at high risk for PPH include those with: (a) placenta previa, accreta, increta and percreta; (b) hematocrit less than 30; (c) bleeding at admission; (d) known bleeding disorders; (e) history of postpartum hemorrhage; and (f) abnormal vital signs, such as hypotension and tachycardia (ACOG, 2017).

There are four causes of PPH, also referred to as “the 4 Ts”: tone; trauma; tissue; and thrombin. As acknowledged previously, uterine tone is responsible for approximately 70 to 80% of all PPH incidences. The other three etiologies are responsible for the remaining 20-30% of PPH incidence. Management of uterine atony includes uterotonics, bimanual compression and uterine massage. Active management of the third stage of labor, aimed at addressing uterine tone, is recognized as the number one preventative treatment for PPH. Active management of the third stage of labor includes 10 units of oxytocin administration, intravenous or intramuscular, after the delivery of the anterior fetal shoulder or administration after placental delivery. Both administration routes for oxytocin are appropriate and neither is proven to be more effective than

another. The other components to active management of the third stage of labor are to give continual cord traction on the placenta and uterine massage (ACOG, 2017).

“Trauma” includes any laceration caused by birth, such as lacerations to perineal tissue or cervix, hematomas, and uterine rupture. “Tissue” involves any foreign tissue retained after delivery, which may include retained membranes, retained placentas in their entirety, and retained placental fragments. Retained tissue can be managed using manual removal, curettage, and/or ultrasound visualization for identification. “Thrombin” refers to identifying any bleeding disorders that may lead to PPH. Bleeding disorders can be mitigated by utilizing replacement of clotting factors, fibrinogen, and other factor replacement sources (ACOG, 2017).

PPH is often misdiagnosed due to implementation of visual estimation of blood loss, leading to an overestimation or underestimation of blood loss (Dildy, 2018). The most accurate way to estimate blood loss is to weigh all pads, peri pads, and cumulative blood loss. Literature shows that visual estimation of blood loss can prolong active management of PPH due to its inaccuracy. Weighing blood lost post delivery can lead to earlier PPH intervention and mitigate bleeding prior to the need for more invasive medical intervention, such as operative management of PPH, hysterectomy, and blood product administration. Systematic blood loss estimation is more effective when determining blood loss (Dildy, 2018).

Pregnant women have three times the amount of blood than the non-pregnant individual. This extra blood volume works to not only supply the fetus and placenta with oxygenated blood, but to also prepare the maternal body for blood loss postpartum (Posner et al., 2013). It is normal to lose some blood during birth and in the postpartum period. All women lose an average of approximately 500 mL of blood during a vaginal birth. If 500 mL or greater of blood loss is noted, it is important to identify the source of bleeding and recognize this as abnormal. Women

who have normal lab work prior to labor onset, including hematocrit and hemoglobin, can easily withstand this amount of blood loss with minimal to no symptoms (ACOG, 2017). When women are anemic or have lab work not indicative of blood loss tolerance, there is not as much reserve when it comes to blood loss. Any time a woman, no matter the amount of blood loss, is symptomatic of hypovolemia it is important to identify and stop the source of bleeding (California Maternal Quality Care Collaboration [CMQCC], 2015). PPH may not be a large amount of blood at one time but a continuous trickle of bleeding. It is important for nursing staff to identify continuous bleeding in the recovery period, not solely large gushes of bleeding and focus more on cumulative blood loss (Posner et al., 2013).

PPH protocol and checklists have been shown to increase interprofessional collaboration and early management during an active PPH. Interprofessional collaboration is defined as any hospital personnel caring for postpartum hemorrhages including: obstetricians, midwives, anesthesiologists, nursing staff, obstetrical technicians, blood bank staff, lab staff, pharmacy staff and other surgical staff (Dildy, 2018). All members of the team should be well educated and informed on postpartum hemorrhage and its unpredictability. Use of an organized and collaborative approach through PPH checklists, carts, protocols and early identification tools can lead to decreased incidents of PPH, maternal morbidity, invasive procedures and admission to intensive care units (ACOG, 2017). In turn, consistent use of a PPH protocol for any occurrence of primary PPH, works to improve patient outcomes (ModernMedicine Network, 2017).

### Project Aims

This Doctor of Nursing Practice quality improvement project aimed to: (1) develop an evidence-based protocol for PPH, which will: (a) increase early identification of postpartum hemorrhages after birth; and (b) improve interprofessional collaboration during an active PPH

emergency.

### Theoretical Framework

The theoretical framework utilized for design of this project was the Iowa Model of Evidence-Based Practice to Promote Quality of Care (Appendix A). This model focuses on seven steps to implement change within the clinical setting. The seven steps of the Iowa Model include: (1) identify the problem; (2) determine the priority level of the problem at the organizational level; (3) form a team to address the problem; (4) collect and synthesize the research evidence regarding the problem; (5) pilot the practice change; (6) evaluate the implementation and continuation in practice; and (7) disseminate the results (Melnik & Fineout-Overholt, 2011). The focus of this project was the first four steps of this model, because no change was piloted. Development of a PPH protocol and interprofessional review occurred. This theoretical framework is applicable regarding the review of an interprofessional PPH protocol because it is a multidisciplinary healthcare team approach to identifying the problem and implementing change at the organizational level.

This project has the potential to impact maternal mortality and morbidity rates at a local hospital and its outlying communities. The impact also goes beyond health and well being; if change is successful in reducing PPH rates and increasing active interprofessional collaboration, a potential decrease in healthcare costs for PPH management and treatment could occur within the organization, at the community level, and at the state level. The Iowa Model is most appropriate because the topic of PPH management and interprofessional collaboration requires a team-based approach for how to improve these rates and implement new practices in the hospital setting.

### Methods

#### **Design**

An evidence-based practice protocol was developed for this quality improvement project utilizing the most current information on PPH identification and management, including use of recommendations from reputable sources. An interprofessional team was then asked to evaluate the protocol and revisions were made prior to dissemination.

**Setting.** The setting for this quality improvement project was a local Midwestern, community-based hospital that serves a population of 64,000 and many outlying rural communities. The hospital has a maternity ward with 17 labor and postpartum beds. The providers that care for patients in the maternity ward is composed of three Certified Nurse-Midwives and nine Obstetricians. The unit has approximately 1800 births a year.

## **Procedure**

**Development of Protocol.** This evidence-based PPH protocol was developed after an extensive review of the literature, including standardized, widely-distributed professional guidelines. A literature matrix (See Appendix B) was developed to compare recommendations and best practices. The protocol was modeled after the California Maternal Quality Care Collaboration (CMQCC) OB Hemorrhage Toolkit (2015) and ACOG Postpartum Hemorrhage Bulletin (2017).

**Evaluation of Protocol.** The protocol and evaluation survey was distributed to a diverse group of healthcare professionals who take part in PPH management at the community hospital. After reading through the protocol, individuals were asked to assess the protocol utilizing the evaluation tool (See Appendix C). Providers were then asked to consider the feasibility of the protocol and appropriateness for this particular community-based hospital setting.

The evaluation tool utilized in this project was the AGREE II evaluation tool from the Appraisal of Guidelines for Research and Evaluation (AGREE) project (Brouwers et al, 2010).

The AGREE evaluation tool is a standardized tool to systematically review quality improvement guidelines and protocols. There are 23 items assessed using a Likert-like scale from 1 to 7, ranging from strongly disagree (1) to strongly agree (7). This tool establishes a quantifiable approach to analyzing quality improvement projects. This tool has been cited 100 times and is used internationally (Cruz, Fahim, & Moore, 2015).

Once the protocol was developed, the protocol was issued to clinicians and survey responses were collected. Survey responses were collected using REDCap, a secure web application for building and managing online surveys (Harris, 2009). This system worked to collect data and organize it within the same system and keep anonymity for participants.

**Analysis.** Data was collected using an evaluation tool based on the AGREE II (See Appendix C). The evaluation tool identified any recommendations, suggestions, or changes to be made to the protocol. The surveys were later reviewed and the data summarized with descriptive statistics, including range, mean, and standard deviation.

**Human Subject Protection.** This project was submitted to the Institutional Review Board (IRB) for designation as a quality improvement project. The IRB approved the project to ensure participant safety and ethical considerations.. Prior to the start of the project, designation as a quality improvement project was obtained (Appendix D).

## Results

The PPH protocol survey (See Appendix E) was distributed via email and social media links to the registered nurses, certified nurse-midwives and obstetricians of a local community hospital. The survey invitation was sent to 50 labor and delivery registered nurses and thirteen obstetrical providers. The response rate was 41.3% (N=26) out the 63 asked to complete the

survey. The sample size was categorized into three categories: 22 (84.6%) registered nurses, three (11.5%) certified nurse-midwives and one (3.8%) obstetrician.

The survey questions of the AGREE II evaluation tool were broken down into 7 domains. These domains include: Domain 1: Scope and Practice; Domain 2: Stakeholder Involvement; Domain 3: Rigor of Development; Domain 4: Clarity of Presentation; Domain 5: Applicability; Domain 6: Editorial Independence and; Domain 7: Recommendations. The answers from participants for the first 6 domains utilized a Likert-like scale of agreement from 1 to 7, with 1 being “strongly disagree” and 7 “strongly agree.”

The first domain assessed the scope and practice of the PPH protocol with three statements included within this domain. The first statement assessed, “The overall objectives of the protocol are specifically described”. Approximately 96.1% of participants had some level of agreeability (“partially agree” to “strongly agree”) to the specificity of the overall objectives of the protocol. The second statement of domain 1 assessed, “The health questions covered by the protocol are specifically described”. Again, approximately 91% reported some level of agreement with the statement. The final statement of this domain assessed, “The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described”. Participant responses to this statement revealed 95% agreement.

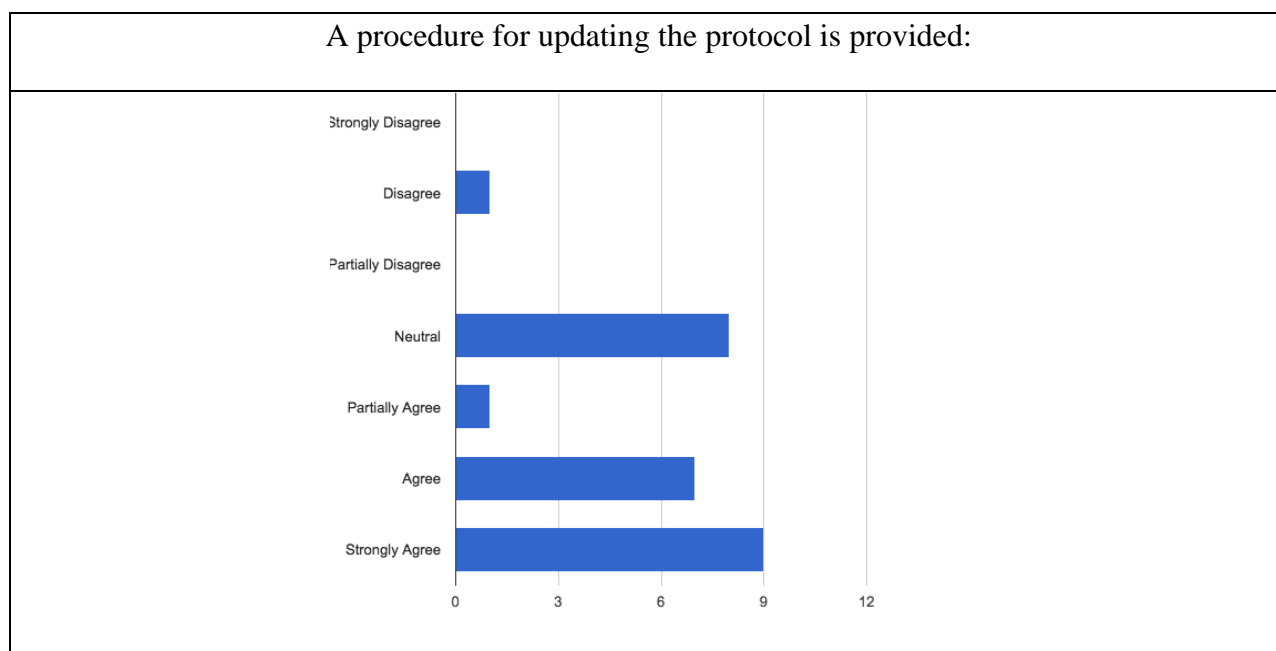
The second domain utilized to assess the PPH protocol identified stakeholder involvement. The first assessment regarding stakeholder involvement was, “The protocol includes individuals from all relevant professional groups”. Participant responses to this assessment included: partially disagree (1, 3.8%); agree (8, 30.8%) and strongly agree (17, 65.4%). There were no comments that included other professional groups that would be pertinent to assess, despite the results from participants indicating need for other relevant

professional groups.

The second assessment of this domain identified, “The views and preferences of the target population (patients, public, etc.) have been sought”. Responses to this assessment included: partially disagree (1, 3.8%); neutral (2, 7.7%); agree (7, 26.9%); and strongly agree (16, 61.5%). The final assessment in this domain included, “The target users of the protocol are clearly defined”. Participants responses ranged from 5, partially agree, to 7, strongly agree. No comments from participants were included regarding this assessment.

The third domain assessed the rigor of development of the PPH protocol, including eight assessment statements to this domain. This domain was the longest in regards to number of participant assessments. One of the eight assessments included “The health benefits, side effects, and risks have been considered in formulating the recommendations”. Participants responses ranged from 5, partially agree, to 7, strongly agree. Another assessment of the third domain included, “There is an explicit link between the recommendations and the supporting evidence”. There were differing levels of agreement amongst participants with, participants responses ranged from 5, partially agree, to 7, strongly agree. The final assessment highlighted from this domain, “A procedure for updating the protocol is provided”. This had the greatest range of responses from participants on the entire survey. The bar graph in Figure 1 specifically demonstrates the participant number and responses with: disagree (1, 3.8%); neutral (8, 30.8%); partially agree (1, 3.8%); agree (7, 26.9%); and strongly agree (9, 34.6%).





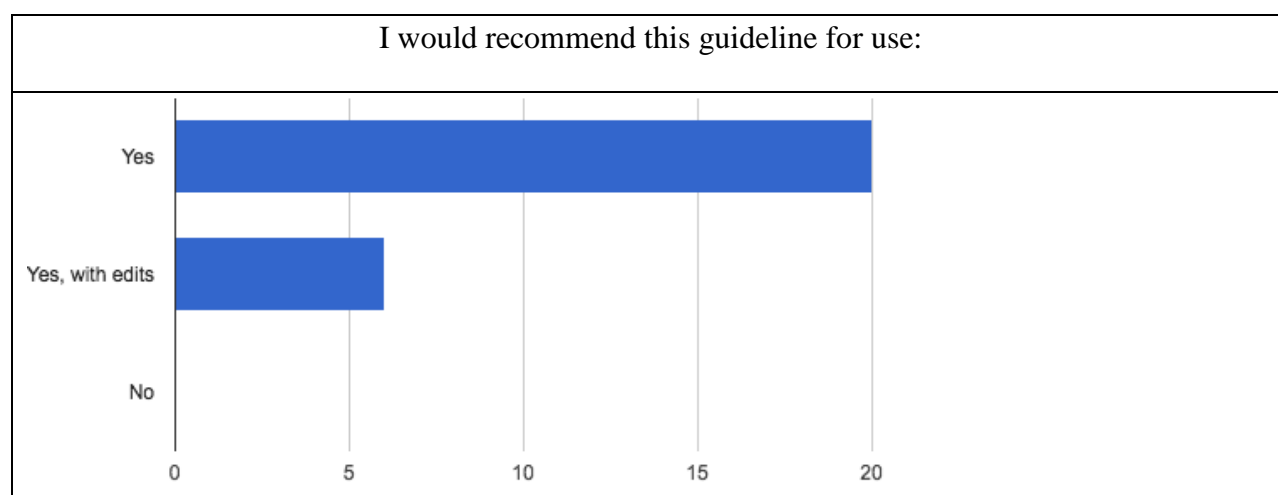
*Figure 1.* Participant responses to Domain 3, question 8 related to updating procedures for the protocol. Adapted from REDCap.

Domain four assesses the clarity of presentation regarding the PPH protocol; the first assessment of this domain included, “The recommendations are specific and unambiguous.” One participant was neutral and the rest of participants agreed or strongly agreed with this assessment. The second assessment of this domain, “The different options for management of the condition or health issue are clearly presented.” Participant responses included: partially disagree (1, 3.8%); partially agree (1, 3.8%); agree (8, 30.8%); and strongly agree (16, 61.5%). The final assessment of this domain included, “Key recommendations are easily identifiable.” The responses to this question ranged from 3 to 7 with responses including: partially disagree (1, 3.8%); partially agree (1, 3.8%); agree (6, 23.1%); and strongly agree (18, 69.2%).

The fifth domain assesses applicability of the PPH protocol. One assessment of this domain assesses, “The protocol provides advice and/or tools on how the recommendations can be put into practice.” Participant responses included responses 5 to 7, with all participants

agreeing on varying levels. The sixth domain looks at editorial independence with one assessment assessing, “The views of the funding body have not influenced the content of the guideline.” Participant responses ranged from neutral (4) to strongly agree (7): neutral (4, 15.4%); partially agree (1, 3.8%); agree (9, 34.6%); and strongly agree (12, 46.2%).

The final domain assessed the quality of the protocol and recommendation of the protocol for use. The overall quality of the protocol was assessed by participants on a scale of 1 (lowest possible quality) to 7 (highest possible quality). Participant responses ranged from 4 to 7 with 88% of responses rating as either a “6” or “7”. The final assessment of this domain assessed the recommendation of the protocol for use. The bar graph below demonstrates participant responses. All participants recommended this protocol be implemented for use, or use with edits (See Figure 2).



*Figure 2.* Bar graph of participants’ responses about recommendations for use of the protocol. Adapted from REDCap.

At the end of the survey, there was a section that allowed for open-ended responses. These open-ended questions assessed participants’ opinions regarding: desired protocol changes;

items participants liked about the protocol; and hindrances to protocol implementation. A prominent theme regarding changes of the PPH protocol was questioning of the definition of PPH. Many thought that definition was inaccurate and represented a large amount of blood loss. Another comment was to address spelling and grammatical changes to the protocol. A different participant questioned administration of methergine every two to four hours. The final comment regarding change was defining active management within the protocol.

The second question aimed to identify what participants liked about the protocol. Several participants liked that the protocol was “straightforward”, “clear”, and systematic in its processes. Another participant enjoyed the risk assessment of the protocol and the quantifiable blood loss. A different participant liked the mention of tranexamic acid (TXA), and its use during a PPH.

The final open-ended question assessed hindrances to implementation of the PPH protocol. A reoccurring comment was “staff members”, “nurses”, and “physicians” being resistant to change. A few participants commented that they would like a more thorough understanding of the logistics on QBL and how it would be completed systematically.

### Discussion

After reviewing the results of the survey, there have been changes made to the protocol (See Appendix F). One change that was not made was redefining PPH. The definition of PPH was defined by ACOG in 2017 and is considered the most up-to-date definition of PPH by a professional organization. Despite ACOG (2017) defining PPH as, “Postpartum hemorrhage is a blood loss of 1000 mL following all birth no matter the route of delivery; or excess blood loss following birth with vital sign changes including, hypotension and tachycardia,” the organization still emphasizes identifying blood loss of 500 mL or greater during a vaginal birth as a

complication and to intervene earlier rather than later. Another change that was not made was the dosing of methergine administration. The administration of methergine, 0.2 mg intramuscularly every 2 to 4 hours, was defined by the CMQCC (2015). This dosage is also recommended by other drug administration guidelines and is considered the most appropriate administration and use of the medication during a PPH. Many providers use methergine outside this recommendation, however, for this protocol the use of evidence based methergine usage will remain within the protocol.

Changes that were included in the protocol included some grammatical and spelling changes. Another change to the protocol was defining active management during a PPH, and defining it earlier in the protocol. There was also added information regarding systematic QBL, to account for blood loss in the under buttocks drape. A change that was not recommended by participants but changed by the principal investigator was “starting hemoglobin less than 11 g/dL with medium or high risk factors” on the risk assessment chart.

### **Limitations**

There were some limitations to this qualitative study. The first limitation can be identified as sample size. The sample size (N=26) was small and surveys were distributed to only one local community hospital. A small sample size and use of one community hospital may limit the applicability of the results to other institutions and groups. This project was also qualitative in nature, which can create issues due to self-reported data, particularly in regards to the open-ended questions at the end. This creates a less systematic process to summarize results.

### **Implications for Future Practice**

This qualitative study results indicated a desire for want and acceptance of future use for a PPH protocol within this institution, after updated and appropriate changes to the protocol

(Appendix F). Future study to assess the changes to the protocol and have it reviewed by past participants may be indicated. There is also potential for future creation and implementation of a PPH cart to include supplies needed during a PPH.

It would also be beneficial to create some resources for systematic QBL, in regards to peri pads and lap sponges weights prior to use during a delivery, this could aid in the efficiency of calculating QBL. A systematic approach could increase accuracy with QBL; however, the goal with QBL is not being exact but to be more accurate than visualizing EBL.

A PPH education slideshow presentation (Appendix G) was developed and presented by the protocol creator to 20 registered nurses after the survey results were collected. This presentation was directly formatted from the evidence used to formulate the protocol and from the CMQCC website. This allowed questions to be answered and education provided to 40% of the registered nurses on the unit. There were no providers, CNM or physician, which attended the presentation, which could be an opportunity for future presentations for the remaining registered nurses and providers.

### Conclusion

This qualitative study revealed that there is some hesitation and misconceptions regarding PPH definitions and management based on staff knowledge at this local community hospital; however, there is a 100% participant desire for PPH protocol implementation. Future education to staff and providers could be beneficial to increase a standardized knowledge amongst caregivers. The development of systematic QBL and a PPH cart could increase overall outcomes based on the literature (CMQCC, 2015). It is imperative that all institutions caring for mothers and newborns in the immediate postpartum period be up to date on PPH education and the use of PPH protocols. With the incident of maternal PPH on the rise, the better prepared

staff and organizations, the better the outcomes (CMQCC, 2015). This has the potential to decrease the overall maternal mortality and morbidity rates related to PPH across the nation.

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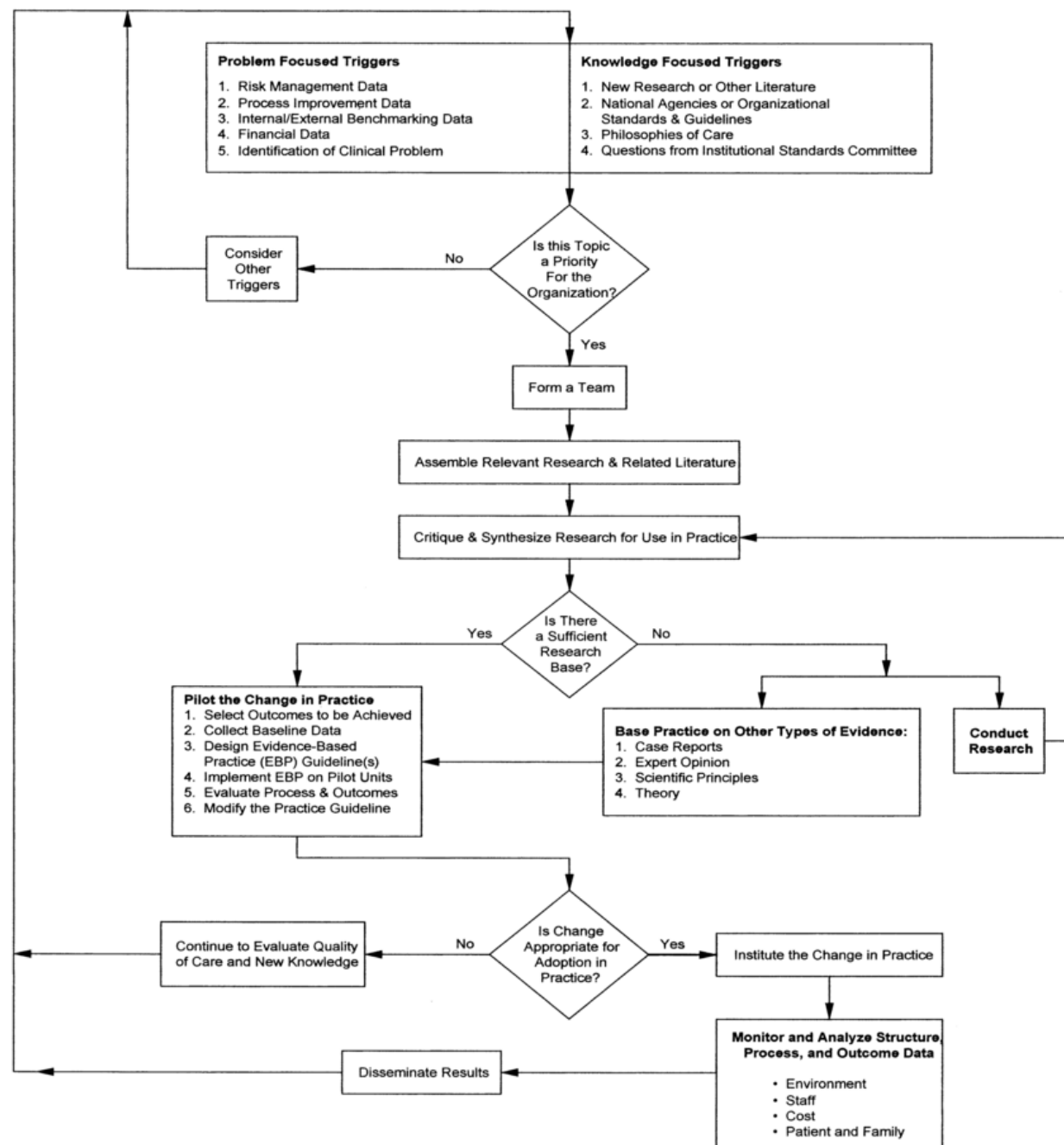


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## Appendix A

**The Iowa Model of  
Evidence-Based Practice to Promote Quality Care**



◊ = a decision point

(Titler, M.G., & et al. 2001)

## Appendix B

## PPH DNP Literature Review Matrix

Citation (author/year)	Purpose	Design	Key Findings	Other Important Notes/ Information
Savirón-Cornudella, R., Esteban, L. M., Laborda-Gotor, R., Rodríguez-Solanilla, B., De Mucio, B., Sanz, G., & ... Castán-Mateo, S. (2018). Maternal morbidity after implementation of a postpartum hemorrhage protocol including use of misoprostol. <i>International Journal Of Gynecology &amp; Obstetrics</i> , 140(2), 198-204. doi:10.1002/ijgo.12361.  (Savirón-Cornudella & et. al., 2018)	To compare maternal morbidity before and after implementation of a postpartum hemorrhage (PPH) protocol	Retrospective analysis	Pre-implementation group tended to have lower hemoglobin levels than did those in the post-implementation group: 811 (8.6%) versus 1349 (5.3%) for levels less than 90 g/L, and 272 (2.9%) versus 497 (2.0%) for levels less than 80 g/L (both $P < 0.001$ )	Implementation of the PPH protocol decreased rates of postpartum anemia and postpartum hysterectomy owing to uterine atony.
Mansfield, J. (2018). Improving practice and reducing significant postpartum haemorrhage through audit. <i>British Journal Of Midwifery</i> , 26(1), 35-43. doi:10.12968/bjom.2018.26.1.35.	To determine whether midwives considered risk factors for PPH and provided informed choice when	Cohort	Incidence of PPH >1000mL had decreased	<u>Practice Changes:</u> -Risk assessment should be careful and ongoing. -Anticipation of risk supports early recognition and treatment - The importance of intravenous (IV) access. - To improve skills in recognition of PPH

(Mansfield, 2018)	planning third stage management, and whether there was any relationship between third stage management and PPH			<p>and administration of uterotonics within 10 minutes to prevent significant PPH</p> <ul style="list-style-type: none"> <li>-Women with estimated blood loss &gt;500mL need closer monitoring with full assessment and 15-minute observations to ensure prompt recognition and treatment</li> <li>-Risk factors should be advised to have active management of the third stage.</li> <li>●● Midwives were encouraged to be more proactive in their administration of oxytocin in response to excess bleeding, important for the prevention of significant PPH in women who have had physiological management (Davis, 2012).</li> </ul>
Doyle, J. L., Kenny, T. H., Gothard, M. D., Seagraves, E., McCarroll, M., & Silber, A. (2018). A Standardized Oxytocin Administration Protocol After Delivery to Reduce the Treatment of	Clinical outcomes were compared before and after introduction of a quality measure: a standardized oxytocin	Retrospective cohort study	Standardized, higher-dose postpartum oxytocin may be associated with less PPH treatment in this cohort. These findings support standardization and set the stage for a	

Postpartum Hemorrhage. <i>The Joint Commission Journal on Quality and Patient Safety</i> .  (Doyle, & et. al., 2018)	protocol for PPH prophylaxis		randomized controlled trial	
Shields, L. E., Wiesner, S., Fulton, J., & Pelletreau, B. (2015). Comprehensive maternal hemorrhage protocols reduce the use of blood products and improve patient safety. <i>American journal of obstetrics and gynecology</i> , 212(3), 272-280.  (Shields, Wiesner, Fulton, & Pelletreau, 2015).	Assess the effectiveness of instituting a comprehensive protocol for the treatment of maternal hemorrhage within a large health care system	Cohort	A significant reduction in blood product use per 1000 births and a non-significant reduction in the number of patients who required puerperal hysterectomy.	Supports implementation of standardized methods for postpartum care and treatment of maternal hemorrhage and support that this approach will reduce maternal morbidity.

## Appendix C

### Evaluation Tool: Postpartum Hemorrhage Protocol Review

On a scale from 1 to 7 please rate each question and circle according to the chart below.

Strongly Disagree	Disagree	Partially Disagree	Neutral	Partially Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

#### **Domain 1: Scope and Practice**

- The overall objectives of the protocol are specifically described.  

1	2	3	4	5	6	7
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- The health questions covered by the protocol are specifically described.  

1	2	3	4	5	6	7
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- The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.  

1	2	3	4	5	6	7
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#### **Domain 2: Stakeholder Involvement**

- The protocol includes individuals from all relevant professional groups.  

1	2	3	4	5	6	7
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- The views and preferences of the target population (patients, public, etc.) have been sought.  

1	2	3	4	5	6	7
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- The target users of the protocol are clearly defined.  

1	2	3	4	5	6	7
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#### **Domain 3: Rigor of Development**

- Systematic methods were used to search for evidence.  

1	2	3	4	5	6	7
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- The criteria for selecting the evidence are clearly described.  

1	2	3	4	5	6	7
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- The strengths and limitations of the body of evidence are clearly described.  

1	2	3	4	5	6	7
---	---	---	---	---	---	---
- The methods for formulating the recommendations are clearly described.  

1	2	3	4	5	6	7
---	---	---	---	---	---	---
- The health benefits, side effects, and risks have been considered in formulating the recommendations.  

1	2	3	4	5	6	7
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- There is an explicit link between the recommendations and the supporting evidence.  

1	2	3	4	5	6	7
---	---	---	---	---	---	---
- The guideline has been externally reviewed by experts prior to its publication.

1	2	3	4	5	6	7
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8. A procedure for updating the protocol is provided.

1	2	3	4	5	6	7
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#### **Domain 4: Clarity of Presentation**

1. The recommendations are specific and unambiguous.

1	2	3	4	5	6	7
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2. The different options for management of the condition or health issue are clearly presented.

1	2	3	4	5	6	7
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3. Key recommendations are easily identifiable.

1	2	3	4	5	6	7
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#### **Domain 5: Applicability**

1. The protocol describes facilitators and barriers to its application

1	2	3	4	5	6	7
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2. The protocol provides advice and/or tools on how the recommendations can be put into practice.

1	2	3	4	5	6	7
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3. The potential resource implications of applying the recommendations have been considered.

1	2	3	4	5	6	7
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4. The protocol presents monitoring and/or auditing criteria.

1	2	3	4	5	6	7
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#### **Domain 6: Editorial Independence**

1. The views of the funding body have not influenced the content of the guideline.

1	2	3	4	5	6	7
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2. Competing interests of the guideline members have been recorded and addressed.

1	2	3	4	5	6	7
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#### **Domain 7:**

1. Rate the overall quality of this guideline. Scale of 1 (lowest possible quality) to 7 (highest possible quality).

1	2	3	4	5	6	7
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2. I would recommend this guideline for use:

Yes	Yes, with edits	No
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**Recommendations:**

- What changes would you like to see in this protocol?
- What did you like about the protocol?
- What hindrances do you see with implementation of the protocol?

**Comments:**



## Appendix D



KB ✓ OK

## KUMC HUMAN SUBJECTS COMMITTEE

**REQUEST FOR  
QUALITY IMPROVEMENT/QUALITY ASSURANCE DETERMINATION**

**\*THIS FORM MUST BE TYPED\***

<b>Project Leader:</b> Cara Busenhart	
<b>Department:</b>	
Email: cbusenhart@kumc.edu	Phone: 913-588-3354
<b>Alternate Contact Person</b> (e.g., Project Coordinator): Jillian Simmons	
Email: jkoelliker@kumc.edu	Phone: 816-344-8421

**Project Title:**

INTERPROFESSIONAL REVIEW OF A POSTPARTUM HEMORRHAGE PROTOCOL

**Project Number, Version and/or Date:**

October 7, 2018

**1. Briefly state the purpose of the proposed project. (Attach project plan if available.)**

This Doctor of Nursing Practice quality improvement project aims to: (1) develop an evidence-based protocol for PPH, which will: (a) increase early identification of postpartum hemorrhage after birth; and (b) improve interprofessional collaboration during an active PPH emergency (See attached project proposal).

**2. Describe the research that has already demonstrated the effectiveness of your intervention. (Cite research and/or attach documentation about the national program or standard you are implementing)**

See attached proposal/protocol.

American College of Obstetricians and Gynecologists (ACOG). (2017). ACOG Practice Bulletin: Clinical Management Guidelines for Obstetrician-Gynecologists Number 183, October 2017: postpartum hemorrhage. Obstetrics and gynecology, 108(4), 1039.

Revised 10/4/16

Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) (2017). The AWHONN postpartum hemorrhage project. Philadelphia: Published by AWHONN through J.B. Lippincott Co.

California Maternal Quality Care Collaboration (CMQCC). (2009). OB Hemorrhage Toolkit. Retrieved from [http://www.cmqcc.org/ob\\_hemorrhage](http://www.cmqcc.org/ob_hemorrhage).

**3. What types of data are needed for the project?**

No data requested.

**4. Do you need access to identifiable patient records to complete the project?**

- ☒ NO  
☐ YES

If yes, who holds the records? \_\_\_\_\_

If yes, which patient identifiers or demographics are needed for the project?  
 \_\_\_\_\_

**5. Which descriptions best fits your project? Check all that apply:**

- ☐ Determine if a previously-implemented clinical practice improved the quality of patient care
- ☒ Evaluate or improve the local implementation of widely-accepted clinical or educational standards that have been proven effective at other locations
- ☐ Gather data on hospital or provider performance for clinical, practical or administrative uses
- ☐ Conduct a needs assessment to guide future changes in local health care delivery or to support other improvements at KUMC
- ☐ Perform an analysis to characterize our patient population/clients to improve quality of services
- ☐ Implement programs to enhance professional development for providers and trainees
- ☐ Measure local efficiency, cost or satisfaction related to standard clinical practices
- ☒ Develop interventions or educational strategies that improve the utilization of recognized best practices
- ☐ Implement strategies to improve communication within our local healthcare environment
- ☐ Improve tools for patients that promote education, health literacy or treatment plan compliance

Revised 10/4/16

6. Does your project involve any of the following aspects? Check all that apply:

- ☐ Randomizing participants into two or more groups  
☐ Student/residents/trainees are randomized  
☐ Patients are randomized  
☐ Healthcare providers are randomized  
☐ Units of the hospital are randomized  
☐ Other Specify: \_\_\_\_\_
- ☐ Surveying a patient population  
☒ Developing clinical practice guidelines  
☐ Developing new curriculum recommendations  
☐ Developing or refining a new assessment tool  
☐ Implementing a novel approach to care that may improve patient outcomes

7. Which institutions are involved in the project?

- ☐ KUMC only  
☒ Other institutions List Mosaic Life Care

8. Which individuals or groups will receive the results of your project?

- ☒ Internal department personnel  
☐ Hospital representatives  
☒ University representatives  
☒ Presentation/publication\*  
☐ Other Specify \_\_\_\_\_

9. How will your results be used to implement local improvements?

My results will aim to propose a PPH protocol and potentially lead to future change within the institution.

\_\_\_\_\_  
Signature\*\*

\_\_\_\_\_  
Date

\_\_\_\_\_  
Type/Print Name

\*Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

## Appendix E

### Labor Delivery Recovery Postpartum Unit Postpartum Hemorrhage Protocol

- I. **Labor Delivery Recovery Postpartum**
- II. **Postpartum Hemorrhage (PPH):** is a blood loss of 1000 mL following all birth no matter the route of delivery; or excess blood loss following birth with vital sign changes including, hypotension and tachycardia.
- III. **PPH Risk Assessment:** pertains to all patients upon admission and during labor progression.
- IV. **PPH Staging:** pertains to all postpartum patients who have lost 500 mL of blood or greater after birth; OR patients who are experiencing a 15% change in vital signs.
- V. **Protocol Documents:**
  - i. Postpartum Hemorrhage Risk Assessment Tools
  - ii. Postpartum Hemorrhage Staging Protocol
  - iii. Postpartum Hemorrhage Medication Summary
- VI. **Protocol:**
  - a. At time of admission all patients will be assessed utilizing the PPH admission risk assessment tool (Appendix A).
    - i. Document level to patient chart
    - ii. Reevaluate risk during LDRP and modify risk assessment level as appropriate.
  - b. 18 gauge IV access established on all patients at time of admission.
  - c. Collect CBC and type and screen on all patients.
  - d. Cross-match 2 units of blood and put on hold for all high-risk hemorrhage patients.
  - e. Notify provider of patients who are high risk for PPH upon admission and notify of any risk assessment changes throughout labor.
  - f. Notify provider and anesthesia of all patients who decline blood products, obtain declination form of blood products from patient.
  - g. At time of delivery, all blood loss will be quantifiably measured.
    - i. Utilizing graduated containers and blood soaked products on PPH cart scale.
    - ii. Refer to PPH cart materials for pre-weights on various items: large blue peri pad, lap sponges and feminine pad.
    - iii. Utilize weight conversion 1 gm=1 mL of blood loss

- h. Following delivery, continue measuring blood loss until patient is stable and out of the postpartum recovery, 4 hours post vaginal delivery and 8 hours post cesarean delivery.
- i. Continue to monitor patient vital signs including: heart rate, oxygen saturation, blood pressure and respirations every 5-15 minutes immediately postpartum until stable and then change vital sign assessment to normal postpartum standard.
- j. Active management of the third stage for all patients, including administration of postpartum oxytocin: Administer 10-40 units per 1000 mL solution at bolus of 500mL/hr, titrate down per uterine tone; OR 10 units IM following delivery of the placenta.
- k. Document stage of OB hemorrhage (Appendix B) in delivery record.
- l. Notify provider if patient OB hemorrhage status has changed at any time during LDRP stay.

### I. Labor and Delivery Admission Antepartum Hemorrhage Risk Level

Low Risk	Medium Risk	High Risk
<ul style="list-style-type: none"> <li>• No previous uterine incisions or surgeries</li> <li>• Singleton pregnancy</li> <li>• &lt;4 previous vaginal deliveries</li> <li>• No known bleeding disorders</li> <li>• No previous history of PPH</li> <li>• Maternal BMI &lt; 30</li> </ul>	<ul style="list-style-type: none"> <li>• Prior cesarean birth or uterine incision/surgery</li> <li>• Multiple gestation</li> <li>• &gt;4 previous vaginal deliveries</li> <li>• Uterine fibroids</li> <li>• Polyhydramnios</li> <li>• History of previous PPH</li> <li>• Estimated fetal weight of 4000 gm or greater</li> <li>• Maternal BMI &gt; 30</li> </ul>	<ul style="list-style-type: none"> <li>• Placenta previa or low lying placenta</li> <li>• Placenta Accreta</li> <li>• Placenta Increta</li> <li>• Placenta Precrreta</li> <li>• Placental abruption</li> <li>• Platelets less than 100 mico/L</li> <li>• Active bleeding on admission</li> <li>• Anticoagulant therapy</li> <li>• Known bleeding disorder</li> </ul>

### Labor and Delivery Reassessment Postpartum Hemorrhage Risk Level

Low Risk	Medium Risk	High Risk
<ul style="list-style-type: none"> <li>• No previous uterine incisions or surgeries</li> <li>• Singleton pregnancy</li> <li>• &lt;5 total previous vaginal deliveries</li> <li>• No known bleeding disorders</li> <li>• No previous history of PPH</li> <li>• Maternal BMI &lt; 30</li> <li>• Uncomplicated vaginal delivery</li> <li>• No vaginal or genital tract trauma</li> </ul>	<ul style="list-style-type: none"> <li>• Prior cesarean birth or uterine incision/surgery</li> <li>• Multiple gestation</li> <li>• &gt;4 previous vaginal deliveries</li> <li>• Uterine fibroids or uterine anomaly</li> <li>• Polyhydramnios</li> <li>• History of previous PPH</li> <li>• Estimated fetal weight of 4000 gm or greater</li> <li>• Maternal BMI &gt; 30</li> <li>• 5 or greater total vaginal births</li> <li>• Chorioaminonitis</li> <li>• Prolonged active labor &gt;12 hours</li> <li>• Prolonged oxytocin use</li> <li>• Rapid Labor</li> <li>• Shoulder Dystocia</li> <li>• Magnesium Sulfate use</li> </ul>	<ul style="list-style-type: none"> <li>• Placenta previa or low lying placenta</li> <li>• Placenta Accreta</li> <li>• Placenta Increta</li> <li>• Placenta Percrreta</li> <li>• Placental abruption</li> <li>• Platelets less than 100 mico/L</li> <li>• Anticoagulant therapy</li> <li>• Known bleeding disorders.</li> <li>• Hematocrit less than 30% with other medium or high risk factors.</li> <li>• Starting hemoglobin less than 11 g/dL.</li> <li>• Active bleeding.</li> </ul>

	<ul style="list-style-type: none"> <li>• Vaginal or genital tract trauma</li> <li>• Episiotomy</li> <li>• Vacuum or forceps use</li> </ul>	
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- I. Patients, who have 2 or more medium risk factors, are considered high-risk level.
- II. Reassess all patients following delivery; they may have a change in risk status.
- III. Cross and match 2 units of packed red blood cells, to hold, for all patients who are high-risk status at any time during LDRP stay.

## II. Postpartum Hemorrhage Staging

<b>Stage 0: All Births</b>	
<ul style="list-style-type: none"> <li>• Monitor blood loss, and measure all blood using a quantifiable method, using graduated cylinders and PPH cart scale.</li> <li>• Use conversion 1 gm=1 mL of blood.</li> <li>• Administer oxytocin 40 units IV per 1000 mL solution at 500 mL/hr and titrate down until uterine tone is stable; OR administer 10 units oxytocin IM.</li> <li>• Continuously monitor vital signs including: heart rate, blood pressure and respirations.</li> <li>• Monitor lochia and postpartum bleeding per postpartum recovery standard until patient is stable.</li> </ul>	<ul style="list-style-type: none"> <li>• If blood loss is 500 mL or &gt; post vaginal delivery or 1000 mL or &gt; post cesarean delivery, continue below to Stage 1.</li> <li>• If there is a 15% change in vital signs continue to Stage 1.</li> <li>• If there is increased bleeding during postpartum or recovery period continue to Stage 1.</li> </ul>
<b>Stage 1: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Notify primary provider if not already present.</li> <li>• Maintain IV access.</li> <li>• Continue to administer oxytocin 40 units IV per 1000 mL solution at 500 mL/hr and titrate down until uterine tone is stable; OR administer 10 units oxytocin IM.</li> <li>• Apply fundal massage</li> <li>• Administer 0.2 mg of methergine IM, if not hypertensive, preeclamptic or eclamptic. Can administer every 2-4 hours up to maximum of 5 doses.</li> </ul>	<ul style="list-style-type: none"> <li>• Proceed to Stage 2, if bleeding continues despite interventions of Stage 1.</li> <li>• Proceed to Stage 2, if bleeding is &lt;1500 mL.</li> <li>• Proceed to Stage 2, if continued vital sign instability.</li> </ul>

<ul style="list-style-type: none"> <li>• If methergine not effective, move to next uterotonic agent.</li> <li>• Continue monitoring vitals signs and LOC.</li> <li>• Administer oxygen.</li> <li>• Continue to weight and record blood loss every 5-15 minutes.</li> <li>• Type and cross match for 2 units of packed RBCs <b>STAT</b>.</li> <li>• Empty bladder using Foley or straight catheter.</li> </ul>	
<b>Stage 2: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Notify anesthesia, blood bank and emergency response team of hemorrhage.</li> <li>• Administer next uterotonic per provider orders: <ul style="list-style-type: none"> <li>○ Hemabate 250 mg IM, can administer every 20 minutes up to 3 times maximum.</li> <li>○ Misoprostol 800 mcg sublingual or per rectum.</li> </ul> </li> <li>• Start second 18 gauge IV.</li> <li>• Call blood bank to order blood products.</li> <li>• Administer blood products once received, using appropriate techniques including but not limited to: 2 patient identifiers, normal saline main line, 2 RN witnesses to verify blood products and assess for blood product reactions.</li> <li>• Draw labs per provider orders.</li> <li>• Continue weighing blood loss and monitoring vital signs.</li> <li>• Move patient to OR.</li> <li>• Order TCA from pharmacy and administer per provider orders.</li> </ul>	<ul style="list-style-type: none"> <li>• Proceed to Stage 3, if blood loss is greater than 1500 mL.</li> <li>• Proceed to Stage 3, if &gt; 2 units of PRBCs administered.</li> <li>• Proceed to Stage 3, if vital signs remain unstable despite interventions.</li> <li>• Proceed to Stage 3, if suspected DIC.</li> </ul>
<b>Stage 3: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Order Massive Transfusion protocol per provider.</li> <li>• Transfer patient to OR, if not already.</li> <li>• Draw labs every 30-60 min, including CBC, Coagulation Panel II and Chem 12 panel STAT.</li> </ul>	<ul style="list-style-type: none"> <li>• Once stabilized move to intensive care unit for recovery.</li> </ul>



<ul style="list-style-type: none"> <li>• Continue monitoring vital signs, measuring EBL, and warming patient.</li> <li>• Circulate in OR.</li> <li>• Notify other personnel including: OR staff, anesthesia, blood bank, second OB provider, unit team leader, ICU and emergency response team, if not already done so.</li> <li>• Surgery preparation and surgery per provider.</li> </ul>	
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### III. Postpartum Hemorrhage Medication Chart

<b><u>Pitocin (Oxytocin):</u></b> 10-40 units, IV or IM	Give to all postpartum patients during active management and until stable.
<b><u>Methergine (Methylergonivine):</u></b> 0.2 mg IM every 2-4 4 hours. If first dose is ineffective, than other doses may not be effective either.	Do not give to patients with preeclampsia, eclampsia or hypertension
<b><u>Hemabate (Carboprost tromthamine):</u></b> 250 mcg can administer IM every 20 minutes. Do not exceed 8 doses.	Do not give to asthmatics. Can cause GI upset.
<b><u>Cytotec (Misoprostol):</u></b> 600 to 800 mcg PO or sublingual x 1 dose. Can also be given rectally.	Do not give if allergy to prostaglandins.
<b><u>Tranexmic Acid (TXA):</u></b> 1 gram in 10 mL (100 mg/mL) IV at 1 mL per minute administered over 10 minutes. It should be given to women with PPH but not greater than 3 hours postpartum. A second dose (1 gram) can be given 30 minutes after first dose, if needed.	Do not give to patients with known bleeding or clotting disorders.

## Appendix F

Labor Delivery Recovery Postpartum Unit  
Postpartum Hemorrhage Protocol—Revised**Labor Delivery Recovery Postpartum**

- I. **Postpartum Hemorrhage (PPH):** is a blood loss of 1000 mL following all birth no matter the route of delivery; or excess blood loss following birth with vital sign changes including, hypotension and tachycardia.
- II. **PPH Risk Assessment:** pertains to all patients upon admission and during labor progression.
- III. **PPH Staging:** pertains to all postpartum patients who have lost 500 mL of blood or greater after birth; OR patients who are experiencing a 15% change in vital signs.
- IV. **Active Management:** use during third labor stage for all patients, including administration of postpartum oxytocin: administer 10-40 units per 1000 mL solution at bolus of 500mL/hr, titrate down per uterine tone; OR 10 units IM following delivery of the placenta.
- V. **Protocol Documents:**
  - i. Postpartum Hemorrhage Risk Assessment Tools
  - ii. Postpartum Hemorrhage Staging Protocol
  - iii. Postpartum Hemorrhage Medication Summary
- VI. **Protocol:**
  - a. At time of admission all patients will be assessed utilizing the PPH admission risk assessment tool (Appendix A).
    - i. Document level to patient chart
    - ii. Reevaluate risk during LDRP and modify risk assessment level as appropriate.
  - b. 18 gauge IV access established on all patients at time of admission.
  - c. Collect CBC and type and screen on all patients.
  - d. Cross-match 2 units of blood and put on hold for all high-risk hemorrhage patients.
  - e. Notify provider of patients who are high risk for PPH upon admission and notify of any risk assessment changes throughout labor and postpartum.
  - f. Notify provider and anesthesia of all patients who decline blood products, obtain declination form of blood products from patient.
  - g. At time of delivery, all blood loss will be quantifiably measured.
    - i. Utilizing graduated containers, under buttocks drapes and blood soaked products on PPH cart scale.

- ii. Refer to PPH cart materials for pre-weights on various items: large blue peri pad, lap sponges and feminine pad.
  - iii. Utilize weight conversion 1 gm=1 mL of blood loss
- h. Following delivery, continue measuring blood loss until patient is stable and out of the postpartum recovery, 4 hours post vaginal delivery and 8 hours post cesarean delivery.
- i. Continue to monitor patient vital signs including: heart rate, oxygen saturation, blood pressure and respirations every 5-15 minutes immediately postpartum until stable and then change vital sign assessment to normal postpartum standard.
- j. Active management of the third stage for all patients, including administration of postpartum oxytocin: Administer 10-40 units per 1000 mL solution at bolus of 500mL/hr, titrate down per uterine tone; OR 10 units IM following delivery of the placenta.
- k. Document stage of OB hemorrhage (Appendix B) in delivery record.
- l. Notify provider if patient OB hemorrhage status has changed at any time during LDRP stay.

### I. Labor and Delivery Admission Antepartum Hemorrhage Risk Level

Low Risk	Medium Risk	High Risk
<ul style="list-style-type: none"> <li>• No previous uterine incisions or surgeries</li> <li>• Singleton pregnancy</li> <li>• &lt;4 previous vaginal deliveries</li> <li>• No known bleeding disorders</li> <li>• No previous history of PPH</li> <li>• Maternal BMI &lt; 30</li> </ul>	<ul style="list-style-type: none"> <li>• Prior cesarean birth or uterine incision/surgery</li> <li>• Multiple gestation</li> <li>• 4 or greater previous vaginal deliveries</li> <li>• Uterine fibroids</li> <li>• Polyhydramnios</li> <li>• History of previous PPH</li> <li>• Estimated fetal weight of 4000 gm or greater</li> <li>• Maternal BMI &gt; 30</li> </ul>	<ul style="list-style-type: none"> <li>• Placenta previa or low lying placenta</li> <li>• Placenta Accreta</li> <li>• Placenta Increta</li> <li>• Placenta Percreta</li> <li>• Placental abruption</li> <li>• Platelets less than 100 mico/L</li> <li>• Active bleeding on admission</li> <li>• Anticoagulant therapy</li> <li>• Known bleeding disorder</li> </ul>

### Labor and Delivery Reassessment Postpartum Hemorrhage Risk Level

Low Risk	Medium Risk	High Risk
<ul style="list-style-type: none"> <li>• No previous uterine incisions or surgeries</li> <li>• Singleton pregnancy</li> <li>• &lt;4 total previous vaginal deliveries</li> <li>• No known bleeding disorders</li> <li>• No previous history of PPH</li> <li>• Maternal BMI &lt; 30</li> <li>• Uncomplicated vaginal delivery</li> <li>• No vaginal or genital tract trauma</li> </ul>	<ul style="list-style-type: none"> <li>• Prior cesarean birth or uterine incision/surgery</li> <li>• Multiple gestation</li> <li>• 4 or greater previous vaginal deliveries</li> <li>• Uterine fibroids or uterine anomaly</li> <li>• Polyhydramnios</li> <li>• History of previous PPH</li> <li>• Estimated fetal weight of 4000 gm or greater</li> <li>• Maternal BMI &gt; 30</li> <li>• 5 or greater total vaginal births</li> <li>• Chorioaminonitis</li> <li>• Prolonged active labor &gt;12 hours</li> <li>• Prolonged oxytocin use</li> <li>• Rapid Labor</li> <li>• Shoulder Dystocia</li> <li>• Magnesium Sulfate use</li> </ul>	<ul style="list-style-type: none"> <li>• Placenta previa or low lying placenta</li> <li>• Placenta Accreta</li> <li>• Placenta Increta</li> <li>• Placenta Percreta</li> <li>• Placental abruption</li> <li>• Platelets less than 100 mico/L</li> <li>• Anticoagulant therapy</li> <li>• Known bleeding disorders.</li> <li>• Hematocrit less than 30% with other medium or high risk factors.</li> <li>• Starting hemoglobin less than 11 g/dL with medium or high risk factors.</li> <li>• Active bleeding on admission.</li> </ul>

	<ul style="list-style-type: none"> <li>• Vaginal or genital tract trauma</li> <li>• Episiotomy</li> <li>• Vacuum or forceps use</li> </ul>	
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- IV. Patients, who have 2 or more medium risk factors, are considered high-risk level.
- V. Reassess all patients following delivery; they may have a change in risk status.
- VI. Cross and match 2 units of packed red blood cells, to hold, for all patients who are high-risk status at any time during LDRP stay.

## II. Postpartum Hemorrhage Staging

<b>Stage 0: All Births</b>	
<ul style="list-style-type: none"> <li>• Monitor blood loss, and measure all blood using a quantifiable method, using graduated cylinders and PPH cart scale.</li> <li>• Use conversion 1 gm=1 mL of blood.</li> <li>• Administer oxytocin 40 units IV per 1000 mL solution at 500 mL/hr and titrate down until uterine tone is stable; OR administer 10 units oxytocin IM.</li> <li>• Continuously monitor vital signs including: heart rate, blood pressure and respirations.</li> <li>• Monitor lochia and postpartum bleeding per postpartum recovery standard until patient is stable.</li> </ul>	<ul style="list-style-type: none"> <li>• If blood loss is 500 mL or &gt; post vaginal delivery or 1000 mL or &gt; post cesarean delivery, continue below to Stage 1.</li> <li>• If there is a 15% change in vital signs continue to Stage 1.</li> <li>• If there is increased bleeding during postpartum or recovery period continue to Stage 1.</li> </ul>
<b>Stage 1: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Notify primary provider if not already present.</li> <li>• Maintain IV access.</li> <li>• Continue to administer oxytocin 40 units IV per 1000 mL solution at 500 mL/hr and titrate down until uterine tone is stable; OR administer 10 units oxytocin IM.</li> <li>• Apply fundal massage</li> <li>• Administer 0.2 mg of methergine IM, if not hypertensive, preeclamptic or eclamptic. Can administer every 2-4 hours up to maximum of 5 doses.</li> </ul>	<ul style="list-style-type: none"> <li>• Proceed to Stage 2, if bleeding continues despite interventions of Stage 1.</li> <li>• Proceed to Stage 2, if bleeding is &lt;1500 mL.</li> <li>• Proceed to Stage 2, if continued vital sign instability.</li> </ul>

<ul style="list-style-type: none"> <li>• If methergine not effective, move to next uterotonic agent.</li> <li>• Continue monitoring vitals signs and LOC.</li> <li>• Administer oxygen.</li> <li>• Continue to weight and record blood loss every 5-15 minutes.</li> <li>• Type and cross match for 2 units of packed RBCs <b>STAT</b>.</li> <li>• Empty bladder using Foley or straight catheter.</li> </ul>	
<b>Stage 2: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Notify anesthesia, blood bank and emergency response team of hemorrhage.</li> <li>• Administer next uterotonic per provider orders: <ul style="list-style-type: none"> <li>○ Hemabate 250 mg IM, can administer every 20 minutes up to 3 times maximum.</li> <li>○ Misoprostol 800 mcg sublingual or per rectum.</li> </ul> </li> <li>• Start second 18 gauge IV.</li> <li>• Call blood bank to order blood products.</li> <li>• Administer blood products once received, using appropriate techniques including but not limited to: 2 patient identifiers, normal saline main line, 2 RN witnesses to verify blood products and assess for blood product reactions.</li> <li>• Draw labs per provider orders.</li> <li>• Continue weighing blood loss and monitoring vital signs.</li> <li>• Move patient to OR.</li> <li>• Order TXA from pharmacy and administer per provider orders, can administer a second dose 30 min later if ordered by provider.</li> </ul>	<ul style="list-style-type: none"> <li>• Proceed to Stage 3, if blood loss is greater than 1500 mL.</li> <li>• Proceed to Stage 3, if &gt; 2 units of PRBCs administered.</li> <li>• Proceed to Stage 3, if vital signs remain unstable despite interventions.</li> <li>• Proceed to Stage 3, if suspected DIC.</li> </ul>
<b>Stage 3: OB Hemorrhage</b>	
<ul style="list-style-type: none"> <li>• Order Massive Transfusion protocol per provider.</li> <li>• Transfer patient to OR, if not already.</li> </ul>	<ul style="list-style-type: none"> <li>• Once stabilized move to intensive care unit for recovery.</li> </ul>

<ul style="list-style-type: none"> <li>• Draw labs every 30-60 min, including CBC, Coagulation Panel II and Chem 12 panel STAT.</li> <li>• Continue monitoring vital signs, measuring EBL, and warming patient.</li> <li>• Circulate in OR.</li> <li>• Notify other personnel including: OR staff, anesthesia, blood bank, second OB provider, unit team leader, ICU and emergency response team, if not already done so.</li> <li>• Surgery preparation and surgery per provider.</li> </ul>	
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### III. Postpartum Hemorrhage Medication Chart

<b><u>Pitocin (Oxytocin):</u></b> 10-40 units, IV or IM	Give to all postpartum patients during active management and until stable.
<b><u>Methergine (Methylergonivine):</u></b> 0.2 mg IM every 2-4 4 hours. If first dose is ineffective, than other doses may not be effective either.	Do not give to patients with preeclampsia, eclampsia or hypertension
<b><u>Hemabate (Carboprost tromthamine):</u></b> 250 mcg can administer IM every 20 minutes. Do not exceed 8 doses.	Do not give to asthmatics. Can cause GI upset.
<b><u>Cytotec (Misoprostol):</u></b> 600 to 800 mcg PO or sublingual x 1 dose. Can also be given rectally.	Do not give if allergy to prostaglandins.
<b><u>Tranexmic Acid (TXA):</u></b> 1 gram in 10 mL (100 mg/mL) IV at 1 mL per minute administered over 10 minutes. It should be given to women with PPH but not greater than 3 hours postpartum. A second dose (1 gram) can be given 30 minutes after first dose, if needed.	Do not give to patients with known bleeding or clotting disorders.

## Appendix G

### Postpartum Hemorrhage PowerPoint Outline

- I. Postpartum Hemorrhage
- II. Why PPH Education?
  - a. Incidence of obstetric hemorrhage is increasing.
  - b. PPH impacts up to 5% of all births, 125,000 women a year who are affected by PPH
  - c. Hemorrhage deaths reviewed generally have high “preventability” assessment.
  - d. United States ranks 47<sup>th</sup> in the world for maternal mortality.
- III. The goal of this presentation:
  - a. is to affirm and broaden current knowledge of PPH.
  - b. Increase understanding of interventions/medications used during PPH.
- IV. Maternal Morbidity v. Mortality
  - a. Maternal morbidity is defined as negative effects due to pregnancy or childbirth.
  - b. Maternal mortality is maternal death due to pregnancy or childbirth.
- V. Maternal Facts
  - a. Blood volume
    - i. women about 6 L by 30 weeks
  - b. Uterus weight
    - i. Pre pregnancy: 40 – 70 grams
    - ii. Third trimester: 1,200 grams
  - c. Uterine cavity capacity
    - i. Pre pregnancy: 10 mL
    - ii. Third trimester: 5,000 mL
  - d. Blood Flow
    - i. Pre pregnancy: 2% cardiac output
    - ii. Third trimester: 17% cardiac output: 600 – 800 mL/min
- VI. Defining Postpartum Hemorrhage
  - a. WHO defines
    - i. EBL of > 500 mL an “alert line”
    - ii. > 1000 mL an “action line”
  - b. ACOG
    - i. Cumulative EBL > 1,000 mL for either vaginal or cesarean birth with enhanced surveillance and early interventions, as needed, for 500-1000 mL
  - c. Average:
    - i. 500 mL for NSVD
    - ii. 750-1000 mL for C/S
    - iii. For most women these average amounts of blood loss are well tolerated



- d. 4-5% of women > 1000 mL - A clinically significant amount!!

## VII. Primary PPH

- a. Primary PPH is defined as a cumulative blood loss of 1000 mL or more within the first 24 hours of delivery regardless of route of delivery.
- b. It is also defined as significant blood loss with symptoms of hypovolemia, including tachycardia and hypotension, which occurs within the first 24 hours of delivery.
- c. All women with a total blood loss of 500 to 1000 mL postpartum should be monitored closely and may require PPH intervention to prevent further morbidity or mortality.

## VIII. Secondary PPH

- a. Secondary PPH is defined as excessive vaginal or uterine bleeding that occurs between 24 hours post-delivery up to 12 weeks postpartum.
- b. The risk of secondary PPH peaks during the first two weeks postpartum.

## IX. The 4 T's

- a. Tone: overall muscle tone of uterus. Typically felt in fundus but can also be a result exclusively of lower uterine segment.
  - i. Uterine tone is responsible for approximately 70 to 80% of all PPH incidence. The other three etiologies are responsible for the remaining 20-30% of PPH incidence.
- b. Tissue: involves any foreign tissue retained after delivery, which may include retained membranes, retained placentas in their entirety, and retained placental fragments
- c. Trauma: any laceration caused by birth, such as lacerations to perineal tissue or cervix, hematomas, and uterine rupture.
- d. Thrombin: refers to identifying any bleeding disorders that may lead to PPH including incidents of HELLP and DIC.

## X. Quantifiable blood loss:

- a. Is systematic blood loss estimation using a scale and reference materials.
- b. It is NOT an exact science.
- c. Literature shows we underestimate blood loss by not using QBL.
- d. Underestimation leads to delay of PPH treatment
- e. It is recommended that QBL be done every time and at every birth and through postpartum recovery, NOT just during a PPH.
  - i. Why?
  - ii. Because all blood loss adds up.
  - iii. Not all women have the same hgb reserve or physiological response to blood loss.
  - iv. Normal for one is not normal for another.
  - v. It is also important to acknowledge the steady trickles not just the large gushes because it all adds up.

- vi. If its **not routine standard, we don't know how** to do it when we need it.  
And we don't recognize WHEN we need it until late in the game...
- vii. Goal is NOT a "perfect, precise" number
- viii. Of course inaccuracies will persist
  - 1. Amniotic fluid contamination, urine
  - 2. Blood clots/other mixed with fluid in the drapes
  - 3. Look an canister during c-section prior to irrigation and account for used lap sponges.
- ix. QBL increases our knowledge of blood loss and is more accurate than EBL
- f. When patient has a hemorrhage, doing QBL is second nature for the team/staff/unit
- g. "This is how we do it here...."
- h. Allows for earlier recognition of excessive blood loss and improved communication among team members.
- i. Avoid delay in management of excessive blood loss

## XI. Identifying Risk Factors

- a. Early identification of PPH is to identify women at greater risk for PPH on admission, before delivery has happened.
- b. PPH risk should be reassessed throughout labor to account for labor risk factors.
- c. 1/3 of women have no PPH risk factors.
- d. PPH admission tools are shown to identify 60-85% of patients who will have a PPH
- e. PPH can occur in low-risk women, but is more likely to occur in women with higher risks of PPH
- f. All women should be screened on admission for risk of PPH.
- g. Women should later be rescreened and regularly during labor PPH risk assessment changes.
- h. Patients, who have 2 or more medium risk factors, are considered high-risk level.
- i. Reassess all patients following delivery; they may have a change in risk status.
- j. Cross and match 2 units of packed red blood cells, to hold, for all patients who are high-risk status at any time during LDRP stay.

## XII. PPH Medications

- a. 1st Line PPH Medication: Pitocin (oxytocin)
  - i. Used for **BOTH** prophylactic and treatment of PPH.
  - ii. Has fewest side effects of all PPH medications.
  - iii. **Contraindication:** allergy/intolerance to drug.
  - iv. **Dosage:** 10-40 units/500-1000 mL IV Fluid with initial rate of 500 mL/hr or > then titrated down.
  - v. **Onset:** rapid onset when infused intravenously; titrate according to uterine tone and bleeding
  - vi. IM: 3-5 minutes, with a clinical response lasting about 2-3 hours
  - vii. **Side Effects:** n/v; rapid infusion can cause hypotension and tachycardia; prolonged use can lead to hyponatremia leading to water intoxication.

- viii. **Storage:** Room temperature
- b. 2nd Line PPH Medications
  - i. Used for **ONLY** treatment
  - ii. 3 options for 2nd Line Treatment:
  - iii. Methergine
  - iv. Hemabate
  - v. Cytotec
- c. WHO states, “Decisions in such situations must be guided by the experience of the provider, the availability of the drugs, and by known contraindications.”
- d. Some recommendations state that methergine should be considered the best option for 2<sup>nd</sup> line choices; however, there is little data to evaluate which second line therapy is preferable.
- e. It is recommended that all units pick a standard “first choice, 2nd line uterotonic of choice”.

XIII. Methergine (methylergonovine maleate):

- a. **Use:** is FDA-approved for routine management of the third stage of labor and postpartum uterine atony.
- b. **Dose:** single dose of 0.2 mg IM or 0.2 mg PO single tab
- c. **Onset:**
- d. PO onset of action is 5-10 minutes
- e. IM onset of action is 2-5 minutes
- f. **Contraindicated:** in preeclampsia or hypertensive patients, including patients who have recently received ephedrine.
- g. **Side Effects:** n/v and exaggerated blood pressure responses.
- h. **Toxicity Sxs:** chest pain, arterial spasm, myocardial infarction, and hallucinations.
- i. **Storage:** IM medication must be refrigerated.

XIV. Hemabate (carboprost or 15 methyl PGF2 alpha):

- a. **Use:** is FDA-approved for treatment of PPH secondary to uterine atony not responsive to conventional treatment (massage and oxytocin).
- b. **Dose:** 250 mcg IM
- c. **Peak Plasma Level:** 30 min after injection
- d. **Administration:** A 250 mcg dose can be given every 15 minutes
- e. **Max Dose:** Do not exceed 2 mg or 8 doses TOTAL
- f. **Success Rate:** 75% success after 1 dose.
- g. **Storage:** Needs refrigerated.
- h. **Contraindications:** Asthma, liver disease, heart disease and hypersensitivity to drug.
- i. **Side effects:** n/v, diarrhea, fever (up to 1 degree C), bronchospasm.
- j. In general, chorioamnionitis can cause these uterotonics to be less effective, **particularly** hemabate.

XV. Cytotec (misoprostol):

- a. **Use:**

- b. is FDA approved for reducing the risk of NSAID-induced gastric ulcers not for uterine atony.
- c. is water-soluble and is quickly absorbed after sublingual, oral, vaginal, and rectal use.
- d. **Sides Effects:** fever (22-58% of patients), diarrhea, shivering, and headaches.
- e. **Administration Facts:**
- f. plasma concentration is higher than when given rectally and maintained for longer periods of time
- g. the time to peak plasma concentration is shortest for sublingual administration
- h. Due to ingestion processes, it is unlikely that misoprostol would be effective if hemabate has failed or vice versa

#### XVI. Tranexamic acid (TXA)

- a. TXA is an inhibitor of fibrinolysis and may reduce bleeding in the setting of coagulation abnormalities.
- b. It is NOT an initial treatment of PPH.
- c. It has been used by France and United Kingdom for years.
- d. The WOMAN international randomized controlled trial showed a 31% reduction in death from hemorrhage when 1g of TXA was administered intravenously within 3 hours after the diagnosis of PPH. This trial included over 20,000 women with PPH.
- e. The WOMAN trial demonstrated that TXA is most effective when given within 3 hours of hemorrhage diagnosis, hence the recommendation that it be considered relatively early in the hemorrhage protocol.
- f. Administer if bleeding continues after higher dose oxytocin and methergine have been administered and additional interventions (e.g. Hemabate or compression balloons) are being considered.
- g. TXA should be considered for inclusion in the unit OB Hemorrhage medication kit for rapid accessibility.
- h. Restriction to a hemorrhage medication kit may reduce the risk of look-alike drug error (specifically do not put TXA in same place as local anesthetics).
- i. Fibrinogen replacement in the setting of fibrin breakdown is most effective if given AFTER administration of TXA (but don't delay blood products to administer TXA if the clinical condition calls for transfusion).
- j. TXA solution for intravenous use contains 100mg per ml. can be used as slow IV injection or diluted within a 50 or 100ml IV piggyback to be given as an intravenous infusion.
- k. To avoid hypotension, administer at a rate not to exceed 100 mg per minute. (i.e 1gm over 10 minutes)
- l. Prepare the same day the solution is to be used; discard any remaining solution after single-use.
- m. May be mixed with most solutions for infusion such as electrolyte, carbohydrate, amino acid, and dextran solutions.
- n. Do not add heparin to injection or mix with blood; do not mix with solutions containing penicillin.

- XVII. PPH Hemorrhage Carts/Kits
  - a. Quick access to emergency supplies
  - b. Refrigerator for meds
  - c. Establish necessary items and par levels
  - d. Label drawers/compartments
  - e. Include checklists
  - f. Develop process for checking and restocking
  - g. Educate nursing and provider staff
  - h. Can be simple or advanced as a code cart with refrigerator included.
  
- XVIII. Basic Needs For Carts/Kits
  - a. IV start supplies
  - b. IV fluids and tubing
  - c. PPH medications
  - d. Syringes
  - e. Needles
  - f. Alcohol
  - g. Scale
  - h. Graduated Cylinder
  - i. Foley Catheter
  - j. Bakri/Uterine Balloon
  - k. Instruments: retractors, speculums, speculums, suture etc.
  - l. Reference Guides for Weighing Items
  - m. PPH Checklist
  
- XIX. Use of PPH Protocols and Checklists/Staging
  - a. PPH protocols and checklists are highly recommended along with PPH kits and carts.
  - b. The idea behind a checklist is to keep a team focused approach and have a sequence of what is next from all angles.
  - c. See PPH protocol.
  
- XX. PPH Economics
  - a. Blood products are VERY expensive
  - b. Hemabate is ALSO VERY expensive
  - c. Surgical Intervention is very expensive
  - d. Math: more early interventions  
 =fewer hemorrhages that reach “massive”  
 =fewer high level (expensive) interventions
  
- XXI. Recommendations
  - a. All relevant uterotonic medications should be readily available for emergent use.
  - b. All LDRP units should have a standardized medication regimen.
  - c. All LDRP units should use quantifiable blood loss.
  - d. PPH trays, carts or kits should be kept on LDRP units and ready for emergent need/use.

- e. All team members should be well versed on PPH: lab, blood bank, RN, OB providers, anesthesia, OB technicians etc.
- f. PPH management is a TEAM effort.
- g. Active management of the 3<sup>rd</sup> stage for all.
- h. Vigilant vital sign monitoring
- i. 1/3 of patients will have no risk factors prior to labor
- j. Must be prepared for every patient
- k. QBL every delivery so can respond early

XXII. Preparation is key

- a. What resources are available?
- b. What resources need to be developed?
- c. Do all team members know what they are and how to deploy/utilize these resources?
- d. Early recognition of triggers: empowering any team member to activate protocol and call for help
- e. Call it what it is and don't be afraid to say to the team we are having a PPH
- f. Sequential utilization of patient monitoring, evaluation, medications, and procedures.